experience of the superintendents and some of the temperature control men, who now have a basis of carefully compiled data for their own building, reports indicate that the season now closing has been remarkably successful, compliments from customers being general at the time of removal of goods, with no complaints yet made, although some of the eggs have been held eight or more months and some of the candy for about one year.

It has been found that sling psychrometer readings are the most practical method of finding the relative humidity in different portions of the rooms, a special cold storage instrument graduated to tenths of degrees being very convenient, as well as exact, if carefully used. However, this instrument is intended only for readings of 40° or lower and can not be used in some candy storage rooms. Graphs are prepared for each room to show the progressive trend of temperature and humidity, temperature readings being taken every four to six hours. At the time the product goes out of storage the factors influencing its condition are plotted for comparison with the ideal sought.

The investigation has included brick, concrete, and wooden buildings, with different methods of refrigeration and various kinds of insulation. As a result of the facts learned, the firm for which this line of work was first undertaken is now reconstructing a large warehouse so that the factors of temperature, humidity ,and air circulation may be absolutely controlled mechanically, thus enabling them to handle such products as eggs and candy under exactly the conditions desired at all times.

Some of the reasons which influence practical business men to demand such a special service from an outsider are: (1) That the man so employed may combine his training with an ever broadening experience with different firms and in various kinds of plants so as to act as an adviser in new problems which arise from time to time; (2) that he will be in a position to give warning of any departures from a standard margin of safety and suggest means for their immediate correction; (3) that he may serve as an unbiased check upon regular employees who might be inclined to relax vigilance at times; (4) the fact of their having an outsider on the alert for any possible improvements in handling goods has a real value in securing business in competition with other firms which may be drifting along by rule of thumb.

In view of the increasing local interest in temperature and humidity control in the storage of foods and in many problems of manufacture, it would seem that there is a latent field for specialized work in each of the large commercial centers of the country.

THE DISTRIBUTION OF CLIMATOLOGICAL STATIONS.

By CLARENCE J. ROOT, Meteorologist.

[Weather Bureau, Springfield, Ill., 1920.]

In an article appearing in the February, 1920, number of the *"Bulletin of the American Meteorological Society,"* Prof. J. Warren Smith is quoted as saying:

> An expression of opinion should be obtained also in connection with temperature records. Do we have enough of these? Do we have too many at present, and should part of the money now expended in that connection be put into more rainfall records?

The statements that follow are written for the purpose of bringing out a discussion of the subject, and the opinions of men who have had experience in climatological work would be valuable and interesting.

In an area with varied topographical conditions, a large number of temperature and all-year precipitation stations are no doubt needed, but Illinois, with the exception of its two hilly areas, is an almost level prairie. The influence of Lake Michigan is felt in the extreme northeast portion of the State. Does Illinois need 64 full all-year weather stations, with 6 regular stations on its immediate borders but in other States?

Illinois is the second agricultural State in the Union, and the needs of agriculture should be given prime consideration. Except in the hill areas and near Lake Michigan, the temperature differences are principally those of latitude and the movements of cyclonic disturbances. The distribution of precipitation during the winter six months is quite uniform over rather large areas. During the summer months, and to a large extent in the spring and fall, the rainfall is of the local shower type. Great variations, both as to amount and time, occur over very limited areas, and here the question arises, Have we enough precipitation stations in Illinois during the crop-growing season?

There is another argument in favor of increasing the number of summer precipitation stations rather than to establish additional all-year stations. It requires considerable skill to properly handle the precipitation feature during the winter, and acceptable observers can not be found in every community. Then, too, the extra work of making snowfall measurements, and the inclement weather in which the duties must be performed, deter many from undertaking the obligation. On the other hand, almost any one would be glad to measure summer showers for the Government and the duties are so simple that any reliable person would be acceptable for this service. He would make entries only in column 7, Form 1009, Meteorological.

As an experiment, the writer prepared two maps of the State (Illinois), one showing the effect of enforcing the 25-mile limitation, and the other showing the effect of a 40-mile limitation for the all-year stations. A compass was set for a radius of 40 miles and circles were drawn about the regular station in and bordering on Illinois. Then places such as Rockford (an important city), and Urbana (the University of Illinois) were selected as permanent stations. Circles were then drawn about other stations in such manner as to give a good geographical distribution. The stations falling within the radii of these circles were considered unnecessary. An enforcement of the 25-mile limit would reduce the number of full stations (temperature and precipitation) from 64 to 41. The 40-mile limitation would reduce the number from 64 to 24.

It might be advisable to establish 175 crop-season rainfall stations in the State. With the 24 all-year stations, there would be about 200 summer precipitation stations, or about an average of two to a county. The money saved in thermometers, shelters, and supports should more than offset the expense of the additional rain gages.